

WHAT IS CLAIMED IS:

1. A high-speed mail sorting apparatus for automated screening of parcels to identify parcels likely to contain biological or non-biological contaminants, comprising:

a parcel opener for creating an opening in each parcel;

a pinch roller for compressing the opened parcel;

an air duct for channeling an air flow over the opened parcel as the opened parcel is compressed; and

a particulate sampler for analyzing the air flow to detect whether the opened parcel is likely to contain contaminants.

2. The apparatus of Claim 1, further comprising an alarm for notifying an operator when an opened parcel is determined to be likely to contain contaminants.

3. The apparatus of Claim 1, further comprising a dwell chamber, from which the particulate sampler extracts an air sample from the air flow for analysis.

4. The apparatus of Claim 3, wherein the dwell chamber slows the air flow, to allow contaminants to settle from the air flow.

5. The apparatus of Claim 1, wherein the opening is created in a predetermined position to eject contaminants from the parcel in a predetermined direction.

6. The apparatus of Claim 5, further comprising a puff detector for recording and comparing a series of digital images in the predetermined direction to determine whether the parcel is likely to contain contaminants.

7. The apparatus of Claim 1, further including a particulate concentrator for filtering the air flow, wherein the particulate concentrator is analyzed at periodic intervals to confirm the accuracy of the analysis performed by the particulate sampler.

8. The apparatus of Claim 1, wherein the parcel opener is a laser.

9. The apparatus of Claim 1, wherein the parcel opener is a rotary puncher.

10. The apparatus of Claim 9, wherein the rotary puncher comprises a cutting disk which is integral with the pinch roller.

11. The apparatus of Claim 10, wherein the cutting disk includes a row of spikes protruding beyond an outer circumference of the pinch roller.

12. The apparatus of Claim 11, wherein the rotary puncher creates a plurality of openings in the parcel, wherein the plurality of openings are arranged in a row along the parcel.

13. The apparatus of Claim 1, further comprising a parcel separator that separates and individually feeds each parcel into the parcel opener.

14. A high-speed mail sorting apparatus for automated screening of parcels to identify parcels likely to contain biological or non-biological contaminants, comprising:

a parcel opener for creating an opening in each parcel;

a pinch roller for compressing each of a series of opened parcels;

an air duct for channeling an air flow over the pinch roller as the pinch roller

compresses each of the series of opened parcels; and

a particulate concentrator for filtering the air flow, wherein the particulate concentrator is analyzed at periodic intervals to detect whether the series of opened parcel is likely to contain contaminants.

15. A high-speed mail sorting apparatus for automated screening of parcels to identify parcels likely to contain biological or non-biological contaminants, comprising:

a parcel opener for creating an opening on each parcel in a predetermined position;
a pinch roller for compressing each opened parcel and ejecting contaminants from the opened parcel in a predetermined direction; and

a puff detector for recording a series of digital images as each opened parcel is compressed, wherein each of the series of digital images is taken in the predetermined direction, and for comparing the series of digital images to determine whether the opened parcel is likely to contain contaminants.

16. A method for automated screening of parcels sorted by a high speed mail sorting apparatus to identify parcels likely to contain contaminants, comprising the steps of:

opening each parcel;
utilizing a pinch roller to compress each opened parcel;
creating an air flow over the pinch roller; and
analyzing the air flow to detect whether the opened parcel is likely to contain contaminants.

17. The method of Claim 16, wherein the analyzing step further includes sampling the air flow.

18. The method of Claim 16, wherein the analyzing step further includes filtering the air flow with a particulate concentrator and analyzing the particulate concentrator at periodic intervals to detect whether a series of individually compressed parcels is likely to contain contaminants.

19. The method of Claim 16, wherein each parcel is opened by creating a plurality of holes in each parcel in a plurality of predetermined positions.

20. The method of Claim 19, wherein the compressing ejects, in a predetermined direction, contaminants from each parcel.

21. The method of Claim 20, wherein the analyzing step further includes:
recording a series of digital images taken in the predetermined direction as the opened parcel is compressed; and
comparing the series of digital images to determine whether the opened parcel is suspected of containing contaminants.